26. Software Development Tools

Created: April 1, 2003
Updated: March 19, 2004

Software Development Tools

The overview for this chapter consists of the following topics:

- Introduction
- Chapter Outline

Introduction

This chapter discusses the tools used in-house by software developers at NCBI -- such as debuggers, memory checkers, profilers, etc.

Chapter Outline

The following is an outline of the topics presented in this chapter:

- Debuggers
    - F.A.Q.
    - DBX
    - GDB
    - TotalView
    - DDD
- Profilers
    - Quantify
    - gprof
    - VTune
- Memory Checkers
    - Purify

- Bounds Checker
- Valgrind
- Third

Debuggers

F.A.Q.

1. **How to point debuggers to the right source location** If application is linked with the pre-built libraries from "*$NCBI/c++.**", then the debugger only knows to search for the source files in the directories where the libs were built originally (on some obscure host, in a weird place like "*/j/coremake/c++2*" rather than in the public place where the pre-built libs are installed for common usage ("*$NCBI/c++.*/{src,include}/**").

   The solution for the above problem is listed below

   - DBX: In "~/.dbxrc": pathmap /home/coremake/c++ /netopt/ncbi_tools/c++ pathmap /home/coremake/c++2 /netopt/ncbi_tools/c++ pathmap /j/coremake/c++ /netopt/ncbi_tools/c++ pathmap /j/coremake/c++2 /netopt/ncbi_tools/c++ ...and so on...
   - GDB:In "~/.gdbinit": directory /netopt/ncbi_tools/c++/src/corelib directory /netopt/ncbi_tools/c++/include/corelib directory /netopt/ncbi_tools/c++/src/connect directory /netopt/ncbi_tools/c++/include/connect directory /netopt/ncbi_tools/c++/src/cgi directory /netopt/ncbi_tools/c++/include/cgi directory /netopt/ncbi_tools/c++/src/html directory /netopt/ncbi_tools/c++/include/html directory /netopt/ncbi_tools/c++/src/objmgr directory /netopt/ncbi_tools/c++/include/objmgr ...and so on... Unfortunately, GDB apparently misses the DBX's ability to map whole directory trees recursively, so for GDB you will have to list each source dir separately.)If you use "stable" libs (those installed in "*$NCBI/c++.stable*") than you should adjust your "*~/.dbxrc*" (and/or "*~/.gdbinit*") by replacing "*.../c++/...*" there to "*.../c++.stable/...*". The same goes for the "potluck", "current"("metastable"), and so-called dated ("*.../c++.by-date/YYYYMMDD/...*") public build installations.

DBX

GDB

TotalView

DDD

Profilers

Quantify

gprof

VTune

Memory Checkers

Purify

Bounds Checker

Valgrind

Third

On `Alpha` systems running `OSF1` or `Tru64 UNIX`, a tool called *Third Degree* is available which is a heap usage, memory leak profiler, checker for reading un-initialized memory, and a memory-access error checker for C/C++ programs

Third Degree creates an instrumented version of a debug-able C/C++ program called *program.third* where *program* is the name of the executable. By default, *Third Degree* produces a log file of stack traces for places where the heap memory was allocated and subsequentlyleaked during a test run of the instrumented program.

Third Degree does have some known limitations such as not always working well with code optimizing options, and not being able to leaks because of old pointers found in the memory. Please consult the man page on this tool for additional information.

Details on *Third Degree* error messages can be found here [http://h30097.www3.hp.com/cplus/ugu3dapp.htm]. An online man page on the *Third Degree* tool can be found here [http://www.public.iastate.edu/cgi-bin/man2html?third].